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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,910	10/21/2003	Paul M. Enquist	239235US-20	3774

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ALEXANDRIA, VA 22314

EXAMINER

YEVSIKOV, VICTOR V

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 06/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/688,910

Applicant(s)

ENQUIST, PAUL M.

Examiner

Victor V Yevsikov

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-64 is/are pending in the application.
- 4a) Of the above claim(s) 49-64 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27-48 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5, 8-10, 13, 16, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 3, 4, 6, 7, 11, 12, 14, 15, 17, 18 and 21-26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 1212

Claims 49-72, drawn to semiconductor devices, classified in class 257, subclass 686.

Claims 1-48, drawn to method of bonding of plural semiconductor substrates, classified in class 438, subclass 455.

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)).

In the instant case unpatentability of the Group I invention would not necessarily imply unpatentability of the group II invention, for example, the product as claimed can be made by another and materially different process for example, such device (integrated device) could be made by materially different process, which does not necessitate the use of ^{masking}asking to generate the vias.

Because these inventions are distinct for the reasons given above and have acquired a separate status of the art as shown by their different classification, the fields

Art Unit: 2825

of search are not co-extensive, restriction for examination purposes as indicated is proper.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

During a telephone conversation with Mr. Eckhard H. Kuesters, Reg. No. 28,870 on May, 07 2004, a provisional election was made to prosecute the invention of Group II claims 1-48 (method). Claims 49-64 withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected claims, there being no allowable generic or linking claim. Applicant traversed the restriction (election) requirement.

Applicant in replying to this Office Action must make affirmation of this election.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 5, 8-10, 13, 16, 19 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Enquist et al. (U.S. 2002/0094661 A1).

With respect to claims 1, 2, 5, 8-10, 13, 16, 19 and 20 Enquist teaches a method of interconnecting first and second elements bonded together, comprising:

forming one mask over an exposed side of the first element;

using the one mask to etch the first element 41 and expose a first contact structure 44 in the first element, etch through a bond interface between the first and second elements, and expose a second contact structure 47 in the second element 46, and

connecting 51 the first and second contact structures (Reference: figs. 11A - 15 with corresponding text (§§ 0080-0085)); and wherein:

2. exposing the first contact structure comprises exposing a planar surface of the first contact structure 44 and connecting 51 the planar surface to the second contact structure 47 (fig. 14).
5. forming the first contact structure 203 as at least a pair of contact elements with a space 209 between the contact elements; and etching through the space to expose the second contact structure 201 (fig. 39J).
8. removing at least a portion of a substrate 20 (figs. 7, 8) of the first element after bonding; and performing the etching step after the removing step.
9. a plurality of first elements 202 (fig. 39A) are bonded to the second element 204, the method comprising forming the one mask over an exposed side of each of the first elements; using the one mask to etch each of the first elements 208 to expose a first contact structure 203 in each of the first elements, etch through a bond interface between each of the first elements 208 and the second element 204, and expose a

Art Unit: 2825

plurality of second contact structures 201 in the second element 204; and connecting the first and second contact structures (figs. 39E, 39F).

10. removing at least a portion of a substrate of each of the first elements after bonding; and performing the etching step after the removing step (figs 39B-39E).

13. forming a dielectric layer 52 (fig. 15) on the first element; forming the mask on the dielectric layer.

16. forming a via 210, 211 in the first element during the etching step; forming a dielectric layer 212 on sidewalls of the via; and etching the dielectric layer to expose the first and second contact structures (figs. 39E-39G).

19. the first element 41 comprises a first device having the first contact structure 42-44 and the second element 46 comprises a second device having the second contact structure 47-49 (fig.14).

20. the first element 58 comprises a first device having the first contact structure 56 and the second element 41 comprises a module having a plurality of connection structures 43,48 including the second contact structure (fig.15).

Allowable Subject Matter

Claims 27-48 are allowed.

The following is an examiner's statement of reasons for allowance:

Prior art does not teach a method of connecting, wherein etching the first device using the first mask to expose a first contact structure in the first device; and etching using the

Art Unit: 2825

first contact structure as a second mask to expose a second contact structure in the element.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Claim Objections

Claims 3, 4, 6, 7, 11, 12, 14, 15, 17, 18, 21-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor Yevsikov whose telephone number is (571) 272-1910. The examiner can normally be reached on Monday –Thursdays 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, examiner's supervisor, Matthew S. Smith, can be reached on (571) 272-1907. The fax phone numbers for the organization where this application or processing is assigned is (703) 873-9306.

Art Unit: 2825

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished application is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Victor Yevsikov

Examiner

Art Unit 2825

May 26, 2004



MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
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